Exemption No. 7957

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
KANSAS CITY, MISSOURI 64106

In the matter of the petition of	
INIZIATIVE INDUSTRIALI ITALIANE (3I)	
	Regulatory Docket No.
for exemption from § 23.562	[FAA-2002-13656-1]
of Title 14 of the Code of Federal Regulations	

GRANT OF EXEMPTION

By letter dated October 1, 2002, Mr. Corrado d'Alessandro, Technical Director, Iniziative Industriali Italiane S.p.a. (3I), Viale Gorizia 6, 00198 Rome, Italy, petitioned for an exemption from § 23.562 of Title 14 of the Code of Federal Regulations (CFR). The request for exemption was sent through Ente Nazionale per l'Aviazione Civile (ENAC), the Italian government civil aviation authority. The exemption would permit type certification of the 3I Sky Arrow 650 TCS/TCNS models with seats that have not shown compliance to § 23.562 "Emergency landing dynamic conditions", effective at Amendment level 23-50, by dynamic tests. 3I will demonstrate mitigating factors in the airframe and passenger seating system to show that the exemption will not adversely affect safety.

The petitioner requires relief from the following regulation(s):

§ 23.562 requires each seat/restraint system for use in a normal, utility, or acrobatic category airplane to satisfy by either dynamic tests, or rational analysis supported by dynamic tests, the conditions specified in §§ 23.562(b)(1) and (2). These tests are conducted with an occupant simulated by a 170 pound anthropomorphic test dummy (ATD), as defined by 49 CFR part 572, Subpart B. In addition, compliance with the occupant injury criteria of § 23.562(c) must also be shown during the tests conducted in accordance with §§ 23.562(b)(1) and (2).

The petitioner supports its request with the following information:

3I supplied all relevant information required by 14 CFR part 11.81 "What information must I include in my petition for an exemption?". The following is an excerpt of that submittal. Information such as company address and a summary suitable for publication in the Federal Register is not repeated.

14 CFR § 11.81(c) The extent of relief you seek, and the reason you seek the relief

Iniziative Industriali Italiane S.p.a., Viale Gorizia 6, Rome, Italy, petitions for exemption from regulation 14 CFR § 23.562 "Emergency landing dynamic conditions" for the Sky Arrow 650 TCS/TCNS models. This exemption would allow the 650 TCS/TCNS models to secure a part 23 normal category type certificate. More specifically, 3I seeks certification for the 650 TCNS model for Night Visual Flight Rules (VFR) operations and for the 650 TCS for Day VFR operations only, but with an increased level of safety. 3I, in addition, has demonstrated mitigating factors in the airframe and passenger seating system to show that the exemption will not adversely affect safety.

The Sky Arrow 650 TCS/TCNS models are Joint Aviation Requirements – Very Light Aircraft (JAR-VLA) aircraft. Each model has a maximum gross weight of 650 kg (1432 pounds), a flaps down stall speed of 41 knots, and a maximum capacity of two (2) occupants. Each model is equipped with a Rotax 912 S2 powerplant and a Hoffman H017GHM 174 177C LD propeller certificated to the requirements of 14 CFR parts 33 and 35, respectively. JAR-VLA certificated aircraft are limited to Day VFR operations when certificated under 14 CFR part 21 (Standard Airworthiness Certificate, Special Class). In order to perform Night VFR or Instrument Flight Rule (IFR) operations, a part 23 normal category type certificate is required.

14 CFR § 11.81(d) The reason why granting your request would be in the public interest; that is, how it would benefit the public as a whole

This exemption will permit the Sky Arrow 650 TCS/TCNS models to secure a part 23 normal category type certificate. The level of certitude required for this type certificate category far exceeds that of either an experimental/homebuilt category aircraft or a part 21 special class aircraft. This higher level of certitude may result in an increased level of safety for the Sky Arrow 650 TCS/TCNS over these other aircraft categories.

As a result, the Sky Arrow 650 TCNS would be capable of Night VFR operations with a possible increased level of safety. The Sky Arrow 650 TCS would operate under Day VFR only, but with the same level of safety as the TCNS model. Consequently, the Sky Arrow 650 TCS and TCNS models become a low cost alternative to a homebuilt or special class aircraft, with a possible increased level of safety.

14 CFR § 11.81(e) The reasons why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which you seek the exemption

The following mitigating factors will ensure that the Sky Arrow 650 TCS/TCNS do not experience an adverse safety affect due to a grant of exemption to § 23.562:

1. Each seat on the Sky Arrow 650 TCS/TCNS is equipped with a Schroth crotch strap harness system (5 point) conforming to TSO-C114. 3I has successfully performed a static test (see ENAC approved Report JV 8.35 "Final Report on the Static Crash Tests Performed on the Seats for FAR 23.562 Compliance") on each seat/harness system to an ultimate load of 3060 pounds (170 pounds multiplied by 18 G).

2. A seating system designed to a static load of 170 pounds multiplied by 18 G exceeds the current static design requirement for a normal category part 23 aircraft seating system (9 G). This static test has therefore demonstrated the structural adequacy of the seat, the seat attachment hardware, the harness, and the airframe attachment points of the harness.

3. The Sky Arrow has a 5-point harness seat belt system which minimizes the head flail envelope when compared to a simple shoulder harness. To show compliance to § 23.562, 3I has conservatively used the 30 G head strike envelope determined from the actual test data contained in report "Aircraft Crash Survival Design Guide, Volume 1 - Design Criteria and Checklists", report number USAAVSCOM TR 89-D-22A. The flail envelopes shown in Figure 43 (lateral view) and Figure 45 (front view) of the aforementioned report are those for a 95th percentile Army aviator subjected to a deceleration of 30 G. 3I has combined the longitudinal and lateral 30 G head strike envelopes with the 18 G seat deflections actually measured during the static tests on the seats and, by superimposing the flail envelope and seat deformations to the actual flightdeck, has demonstrated head clearance from impact with any item in the flight deck of the Sky Arrow 650 TCS/TCNS (see Report JV-4.38 rev. 3).

4. The Federal Aviation Administration (FAA) should consider the occupant safety features for these aircraft, identified above, when evaluating the request for exemption to § 23.562. In summary, they are:

- A low airframe gross weight and stall speed which may result in a low impact kinetic energy;
- A seating system that is designed to the item of mass longitudinal load factor for a 170 pound occupant, which exceeds current part 23 requirements;
- The use of a robust 5-point harness;
- A strike free head flail envelope;
- A maximum occupant count of two.

- A tandem seat configuration which avoids lateral head contact between adjacent occupants.

Comments on published petition summary:

> A summary of this petition was published in the FEDERAL REGISTER for public comment on December 12, 2002. [67 FR 76436]. The comment period closed January 2, 2003. No comments were received.

The Federal Aviation Administration's (FAA) analysis is as follows:

To obtain this exemption, the petitioner must show, as required by §§ 11.81(d) and (e) respectively, that granting the request is in the public interest and will not adversely affect safety.

In the early 1990's, the FAA attempted to address the burden that the general aviation industry felt was being placed on very light single engine airplanes with low stall speeds. Their concern was that the certification requirements of 14 CFR part 23 were unnecessarily burdensome to simple, low speed airplanes like the Sky Arrow 650 TCS/TCNS models.

FAA action followed a rule making activity undertaken by the JAA, known as "Joint Aviation Requirements for Very Light Aeroplanes," or JAR-VLA, dated April 26, 1990. Airplanes that are eligible for certification under JAR-VLA must meet the following limitations:

- Single engine with spark or compression ignition
- Maximum occupancy of two (2)
- Maximum certificated takeoff weight of 1,654 pounds
- Maximum power-off stall speed of 45 knots Calibrated Air Speed (CAS) in the landing configuration at maximum weight
- Normal category maneuvers only
- Daytime Visual Flight Rule (Day-VFR) Operations only.

In conjunction with industry, the FAA developed a simplified method to certificate very light airplanes. These airplanes would be treated as a "special class" of airplane under 14 CFR § 21.17(b). The requirements of JAR-VLA would stand as

suitable airworthiness criteria for certification of these airplanes, with the following restrictions:

- The airplanes are limited to normal category maneuvers; and,

- The airplanes are limited to Day-VFR operations only under 14 CFR part 91.

However, 3I requests 14 CFR part 23 type certification for the Sky Arrow 650 TCN and TCNS. The process for part 23 type certification of JAR-VLA airplanes is fully described in draft Advisory Circular 23-11A "14 CFR Part 23 Type Certification of an Airplane Originally Certificated to Joint Aviation Regulation – Very Light Airplane (JAR-VLA) Standards," undated.

The FAA understands the inherent level of safety that is fundamental to this class of airplane, and believes that the use of an exemption with mitigating factors is a valid approach to showing compliance to § 23.562.

In addition, the FAA encourages manufacturers of this class of airplane to obtain a part 23 type certificate. The Directorate believes the level of certitude for part 23 far exceeds that of either an experimental/homebuilt category aircraft or a part 21 primary category aircraft. We agree with 3I that this higher level of certitude may result in an increased level of safety for the Sky Arrow over these other aircraft categories. While the applicant is not showing literal compliance to § 23.562, the applicant is providing suitable mitigating factors to the seats, restraint systems, and airframe to ensure safety is not adversely affected.

As such, the FAA has carefully reviewed the information contained in the Petitioner's request for exemption, and agrees with their arguments.

In consideration of the foregoing, I find that a grant of exemption is in the public interest and will not adversely affect safety. Therefore, pursuant to the authority contained in Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, as amended, delegated to me by the Administrator (14 CFR 11.61), Iniziative Industriali Italiane is granted an exemption from § 23.562 of the Federal Aviation Regulations to the extent necessary to allow type certification of the 3I Models 650 TCS and TCNS without an exact showing of compliance with the requirements of § 23.562. For these models, this exemption is subject to the following conditions and limitations:

1. The current Sky Arrow Models 650 TCS and TCNS aircraft, and future updates to these models, must satisfy the definition of a JAR-VLA class aircraft.

2. This exemption is limited to the Sky Arrow 650 TCS/TCNS as equipped with the seats, restraints, and attachments substantiated in Report JV 8.35. Significant changes to any element of the seat/restraint system may require additional testing and substantiation.

Issued in Kansas City, Missouri on January 27, 2003.

S/

Michael Gallagher
Manager, Small Airplane Directorate
Aircraft Certification Service